

Preface

Life-sciences research, especially in biology and medicine, has undergone dramatic changes in the last fifteen years. Completion of the sequencing of the first microbe genome in 1995 was followed by a flurry of activity. Today we have several hundred complete genomes to hand, including that of humans, and many more to follow. Although genome sequencing has become almost a commodity, the very optimistic initial expectations of this work, including the belief that much could be learned simply by looking at the "blueprint" of life, have largely faded into the background.

It has become evident that knowledge about the genomic organization of life forms must be complemented by understanding of gene-expression patterns and very detailed information about the protein complement of the organisms, and that it will take many years before major inroads can be made into a complete understanding of life. This has led to the development of a variety of "omics" efforts, including genomics, proteomics, metabolomics, and metabonomics. It is a typical sign of the times that about four years ago even a journal called "Omics" emerged.

An introduction to the ever-expanding technology of the subject is a major part of this book, which includes detailed description of the technology used to characterize genomic organization, gene expression patterns, protein complements, and the post-translational modification of proteins. The major model organisms and the work done to gain new insights into their biology are another central focus of the book. Several chapters are also devoted to introducing the bioinformatics tools and analytical strategies which are an integral part of any large-scale experiment.

As public awareness of relatively recent advances in life-science research increases, intense discussion has arisen on how to deal with this new research field. This discussion, which involves many groups in society, is also reflected in this book, with several chapters dedicated to the social consequences of research and development which utilizes the new approaches or the data derived from large-scale experiments. It should be clear that nobody can just ignore this topic, because it has already had direct and indirect effects on everyone's day-to-day life.

The new wave of large-scale research might be of huge benefit to humanity in the future, although in most cases we are still years away from this becoming reality. The promises and dangers of this field must be carefully weighed at each step, and this book tries to make a contribution by introducing the relevant topics that are being discussed not only by scientific experts but by Society's leaders also.

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